

Summary
Steller Sea Lion Recovery Team Meeting
Alaska Fisheries Science Center, Seattle, Washington
30 July – 1 August 2003

Bob Small, Chair of the Steller Sea Lion Recovery Team (SSLRT or RT), opened the meeting at 08:40 on July 30. After Small reviewed the agenda, Pitcher described work being done on vital rates. These included a NMML/ADF&G cooperative program, the NMML branding program at Marmot Island, Brown's study to detect reproductive hormones in feces/blood/milk, and the NMML/Montana State University investigation of a Bayesian approach for estimating birth rates. Pitcher was generally confident that survival data would be available with time, but believed that birth rate data would be more difficult to acquire. Capron reported that a draft of the proposal to split the Western DPS should be completed and ready for review in about a week, and that he should know in about a month whether a status review would be necessary. He suggested that the proposed change in the Western DPS would likely cause only minor changes in the structure of the draft RP background section. Small and Capron reported on a meeting of the NPFMC Mitigation Committee that occurred on July 28. The Mitigation Committee was interested in nutritional stress, and Small provided copies of recent RT minutes. A subcommittee of the Mitigation Committee will review designs for an experiment suggested by the NRC report. Williams and Trites reported that they had made no progress on a revision of the nutritional stress section.

Evaluation of Potential Sources of Nutritional Stress

In addition to the following series of presentations, Springer provided RT members with a discussion paper dealing with marine bird and mammal diet studies in the Gulf of Alaska.

A Review of SSL Abundance and Prey Abundance Trends

Lowell Fritz, National Marine Fisheries Service

Fritz reviewed non-pup SSL counts at rookeries and haulout sites. The counts have generally declined since the 1980s, and Fritz noted that the decline appeared later in the Eastern Gulf of Alaska (GOA) than in other areas. Fritz then reviewed the biomass trends for several important SSL prey species. Year-class variations have caused pollock stocks in the Eastern Bering Sea (EBS) to range between 6 and 12 million tons during the past 20 years, while pollock in the GOA peaked during the 1980s at 4 million metric tons and have since declined to about 1 million metric tons. Aleutian Islands (AI) pollock stocks have been in decline since the late 1980s. Although some early surveys suggested cyclic fluctuations of cod stocks since the 1960s, the overall trend has been decline since the mid-1980s in both the BSAI and the GOA. Surveys for Atka mackerel show variable but generally increasing trends within wide confidence bounds; trawl surveys work less well for species that are highly aggregated. Arrowtooth flounder, rock sole, and rockfish populations have generally increased since the 1980s. Recruitment trends for EBS gadids have been mixed over the past 30 years, while flatfish recruitment was strong during the 1970s and 1980s but lower since. GOA gadid recruitment was strong in the early/mid-1970s but has been sporadic since. GOA arrowtooth flounder stocks had generally poor recruitment prior to 1970 and strong recruitment afterward. There were no strong patterns to GOA rockfish,

and AI Atka mackerel and Pacific Ocean perch recruitment trends. Sitka and Prince William Sound herring stocks increased in the early 1970s and 1980s, and recruitment since then has showed a distinct warm/cold year pattern (recruitment is better in warm years).

Fritz noted that some of the trends from the Piatt and Anderson shrimp trawl study of sites around Kodiak and the Alaska Peninsula were different than those developed by the NMFS stock assessment program. Piatt and Anderson reported an increase in the proportion of gadids and flatfish in their catches since the 1970s. Fritz cautioned that proportion of total catch should not be equated with biomass, but noted that the authors also detected increases in cod and pollock CPUE. While NMFS surveys do reflect an increase in GOA flatfish biomass during that period, they do not show increases in the GOA pollock or cod biomasses. Fritz observed that Piatt and Anderson did not survey areas consistently each year, and that their survey methods changed over time.

Fritz referenced tables on food habits that had been presented at the previous meeting, but called RT attention to several new charts and tables that showed groundfish consumption by groundfish during the 1980s and 1990s. Fritz summarized his presentation by stating his belief that the available data are not sufficiently strong to support the hypothesis of a massive shift in SSL diet from forage fish to gadids.

RT questions and discussion:

- Fritz acknowledged that the NMFS regional survey trends might not reflect prey availability at a particular time and place. Specific survey data might better represent those conditions.
- Some RT members noted that the survey trends suggest that the biomass of pollock in particular was lower during a period of high SSL abundance (1970s) than it is currently. Others questioned whether the early surveys accurately reflect prey biomass; they suggested that there is less confidence in early survey data, or that the trends reflect the data acquisition and “ramping up” process common to many population models. The authors of the NMFS assessment acknowledged some imprecision in the early abundance estimates but affirmed the general biomass trends suggested by their work. They cited the predominance of small fish in early samples as evidence that a large older population was not present.
- RT members questioned the utility of prey biomass trends given the extreme variability they displayed. Some valued that variability as a caution against general statements relating to prey and environmental conditions. Others wanted a more formal analysis of the linkage between prey information and regime shifts, while some noted that there are dissenting views even among experts in the field. Still others suggested that the variability in prey biomass was meaningless because even at its lowest levels prey biomass greatly exceeds the energetic needs of SSL.
- Some RT members suggested that the Piatt and Anderson results were artifacts of sampling methods and areas, and questioned whether gear designed to catch shrimp could provide a reliable estimate of other species. Others RT members maintained these data provide a relative estimate of abundance from year to year in coastal waters, while members of the audience suggested that the results mirrored the experience of local fishers.

- Some RT members objected to the characterization of some groundfish (e.g., arrowtooth flounder) as competitors with SSL for prey, suggesting that their diets merely overlapped. Others related the variability in groundfish predation on groundfish to year class strength; predation increases when there are more juvenile fish to consume.

Associations Between the SSL Decline and the BS/GOA Fishery

Daniel Hennen, Montana State University

SSL abundance data for this study came from the NMFS adult count database of individual animals at each rookery. Data were fitted numerically (least squares) to a two stage regression that described trends before 1991 and after 1991. Hennen used three different starting points for SSL trend data: 1956 (included the most data but carried a risk of geographical bias), 1960 (avoided some bias but included less accurate ocular counts from anchored vessels), and 1977 (included only aerial photographic surveys but started in the peak of the SSL decline). Fishery data came from the NMFS observer database (corrected for observer coverage) and were lumped into 1977-1991 and 1991-2000 time periods. Measures of fishing activity included the number of hauls, catch, and bycatch; the measure of fish abundance was the average weight of all hauls in a time period. Fishery data were stratified by distance from a rookery (0-10 nm, 0-20 nm, 0-30 nm, and 0-50 nm) and by gear type. Hennen used linear regressions of a fishing variable against SSL population trend data to identify potential correlations. Since fishery data are not normally distributed, he also regressed against ranked fishing variables.

Results of the study were as follows:

- There was a significant negative relationship between 1977-1991 fishing activity variables and pre-1991 SSL population data. The relationship held for all three starting points for SSL population data and for ranked and unranked fishery data. The negative slope coefficient was maximized at the 0-20 nm distance stratum.
- There was no consistent pattern between 1977-1991 fish abundance data and pre-1991 SSL population data.
- There was no consistent pattern between fishing activity variables and post-1991 SSL population data.
- There was a positive relationship (not significant for unranked fishery data) between fish abundance data and post-1991 SSL population data (i.e., when fish are abundant, both the fishery and SSL do well).
- Gear-stratified fishing data suggested that small trawl vessels had a larger impact near shore (less than 30 nm) while mothership fishing had a greater impact further offshore.

Hennen cautioned that his study identifies correlations and not cause-and-effect relationships. He tentatively concluded that the present Critical Habitat designations were consistent with the priorities revealed by the analysis, and that existing restrictions on fishing appear to be helping SSL. Hennen suggested the following hypotheses to explain these results: (1) Fishing activity contributed to the decline of SSL before 1991; (2) Since 1991, SSL are not declining as fast in areas of high fish abundance; (3) Since 1991, the SSL decline is not related to differences in fishing intensity; and (4) Fishing activity since 1991 is not creating local contrasts in the SSL decline.

RT questions and discussion:

- RT members asked whether the data had been stratified by region. Although that stratification is possible, Hennen wished to avoid reducing sample size and weakening any correlations. Some RT members noted that the strongest correlations in the existing study did not exceed 20%, so more than 80% of the observed variation is not explained.
- Hennen suggested that additional work with gear stratification, and possibly bathymetry stratification, might be desirable. RT members suggested that percentage of ABC or TAC might be used as a measure of depletion.

Characteristics of Pacific Decadal Variability and Ecosystem Regime Shifts

Nate Mantua, University of Washington, JISAO/SMA Climate Impacts Group

Comparisons between the atmospheric conditions prevalent in the North Pacific during the winters of 1975-76 and 1976-77 provided some of the first evidence for large-scale ecosystem properties in this area. Sea level pressures over the Aleutians were much lower during the latter period, and changes in this pattern in low pressure (relative to average) proved to be a dominant index in the area. Pressure fields drive surface winds and affect the direction of storms, ocean mixing, coastal ocean temperatures, and rainfall. The Aleutian Low appears to follow an El Niño-like pattern of variability with 20 to 30-year periods of persistence that affect climate in the North America and the Pacific basin. When the Aleutian Low is intense (e.g., 1925-1946 and 1977-1998), winter air temperatures in western North America average two degrees above normal and precipitation is reduced, while southeastern North America and Mexico experience cool temperatures and increased rainfall. Periods such as 1900-1920 and 1940-1960 are characterized by Aleutian Lows that are weaker than normal and prolonged cold eras in western North America. Geological observations suggest that this pattern was not prominent during the 1750s to late-1800s, but was stronger during the 1600s. Wavelet analysis suggests a prominent wave pattern with a period of 50-70 years.

Climate researchers are uncertain about the number, dynamics, and predictability of decadal/interdecadal modes that occur in the Pacific climate. There are many ways to examine atmospheric data, and the patterns change when the data are analyzed differently. Researchers also do not know whether they can detect modal changes soon after they occur. The mechanisms that give rise to the Pacific Decadal Oscillation (PDO) may originate in the tropics rather than the Aleutians, and may be related to the strength of circulation cells centered at the equator (meridional overturning circulation).

There is some evidence that PDO affects ecosystem change. Photographs of the catch in ADF&G trawl surveys from the 1960s, 1970s and 1980s show a declining proportion of the catch consists of shrimp and a greater proportion consists of large flatfish, pollock, and cod. The patterns of a variety of other fishery and survey data suggest that changes occurring about 1976/1977 and again in 1988/1989 correlate with PDO regime shifts.

RT questions and discussion:

- Some RT members acknowledged that these types of atmospheric studies provide a broad context under which all other things happen, but suggested that local effects can be

significant. They cited the strong performance of West Coast pinniped stocks despite poor atmospheric indices as an example. Others, however, noted that studies at the University of British Columbia of coherence between salmon patterns and climate patterns suggest that coastal blocks of approximately 200 km seem to move in unison.

Patterns of Alaska Shellfish, Salmon, and Herring Fisheries

Doug Eggers, Alaska Department of Fish and Game

While shellfish are not a major component of the SSL diet, fisheries for shellfish were a major human activity throughout the GOA and AI in the past. King crab fisheries generally peaked in the 1960s, although increased effort extended the catch in areas like Kodiak until the early 1980s. Tanner crab and trawl shrimp fisheries peaked in the 1970s. Nearly all of these fisheries had collapsed by the mid-1980s, although the fishery for Tanner crab persisted around Kodiak into the 1990s. Substantial and striking changes occurred in the benthic ecosystem starting in about 1983.

The overall pattern of Alaska salmon harvests since 1925 suggests a period of higher catches prior to 1946, followed by a period of reduced harvests until catches began to increase again in the 1970s. Much of the increase since 1970 appears to be influenced by the development of an extensive Japanese hatchery program for chum salmon. Declining chinook salmon harvests in recent years are probably related to impacts of the Columbia River dams. By area, recent increases in Southeast Alaska are related to local hatchery programs for pink and chum salmon. In Western Alaska, the Bristol Bay sockeye pattern is dominant; the return-per-spawner for Bristol Bay stocks has increased since 1976. Tagging data suggest that there is substantial overlap of North American salmon stocks rearing in the central GOA, and overlap of Asian and North American stocks in the AI and BS. Migration models suggest that GOA pink, chum, and sockeye salmon enter the ocean and migrate north along the coast, moving into the central GOA to rear before returning home to spawn. These fish appear in coastal waters only as juveniles, except when they return as maturing fish during the summer months. Chinook salmon of all ages are present in coastal waters throughout the year.

There are extensive spawning herring stocks in both Asia and North America, but there are no stocks that spawn in the Aleutians. Scientists think that the prevailing Aleutian weather and geography does not retain herring larvae in suitable rearing areas. The largest spawning stocks in Alaska are currently located at Togiak (Bristol Bay), Cook Inlet, Prince William Sound, and Sitka. Reduction fisheries occurred throughout Alaska from the 1900s into the 1960s and there was a foreign fishery in the Bering Sea in the 1960s and 1970s, but sac roe fisheries on spawning stocks have been dominant since 1970. Scientists believe that herring disperse over the continental shelf after spawning, although overwintering aggregations occur in some areas. Spawn timing is linked to water temperature, and occurs later in more northerly areas. While the reduction fishery was open throughout the summer and fall, sac roe fisheries are characterized by brief, intense openings in the spring and early summer. Herring harvests peaked in the 1960s and again in the 1980s, but the 1970s were characterized by a generally low herring biomass.

Potential Sources of Nutritional Stress – RT Discussion

The RT discussed issues associated with potential sources of nutritional stress to provide additional direction to the workgroup drafting this section of the RP. Some suggested that three major themes could be drawn from these presentations: (1) fish population trends are variable and may show cyclic fluctuations; (2) regime shifts, fisheries, competition with other species, and natural variation all potentially contribute to this variation; and (3) trends are confounded by geographic scale and season. Some members were struck by suggestions that the fish biomass in general was lower during the 1970s than at present (or at least no higher than the present), yet SSL populations were higher during that period. This led to extended discussion about whether the trends were believable. Some argued that the early trends are unreliable due to a variety of sampling or model design factors, that trends were different in the BS and GOA, or that they merely reflected variations in a steady state condition. Others cited the confidence expressed by model builders that the general direction of the trends was accurate. Some suggested that an independent review by experts is needed to resolve whether the amount of prey is currently the same as it was in the 1970s, while others doubted the issue would ever be fully resolved. Others emphasized that prey biomass is not equivalent to carrying capacity, suggesting that accessibility is a more important factor. Eventually the RT expressed general confidence in the trends suggested by NMFS assessment data, recognizing that there is more involved to the issue of nutritional stress than simply area-wide abundance. They suggested that the Nutritional Stress workgroup (Williams, Behnken, Fritz, Trites, Wynne) start with this point, move to a discussion of energetic needs and where SSL must go to get fish, note concerns with data gaps, and then discuss what must be done to resolve these concerns. Springer was added to the group on the strength of information provided in his distribution paper. Some RT members suggested that some attempt be made to partition area-wide (GOA, AI, BS) assessments to better describe the fish biomass available to local SSL populations; Fritz agreed to examine the feasibility of this exercise and report back to the RT.

Local Fishery Harvest Indices

Lowell Fritz and Brandee Gerke, National Marine Fisheries Service

Fritz and Gerke presented a series of materials designed to describe fishery harvests on a finer scale. These included:

- A graphical representation provided by Gerke of groundfish harvests by species in the EBS, GOA, and AI for 1991-2002.
- Tabular and mapped summaries of data from the Addendum to the 2001 Biological Opinion compared catch and biomass of pollock, cod, and Atka mackerel inside and outside of Critical Habitat areas during 1999 and 2002. These materials were designed to examine whether fishery management measures taken since 1999 have effectively moved harvest outside Critical Habitat areas. No general conclusions could be drawn for all fisheries; some fisheries appeared to increase in intensity inside Critical Habitat while there was no noticeable change in others. Fritz noted that NMFS is also examining these data relative to fur seal foraging areas. Fur seals on St. George rookeries are declining at a faster rate than those on St. Paul and the animals forage in different areas; NMFS wants to know if it has inadvertently moved fishing fleets out of SSL habitat and into fur seal habitat. No conclusions have been reached to date.

- Estimated pollock harvest indices in summer and winter by area in the EBS.
- Atka mackerel fishery data from several AI fisheries showing how estimates of biomass could be obtained by projecting the declining slope of fishery CPUE rates to zero.
- Data from the 2001 bottom trawl assessment of Pacific cod that estimated the proportion of fish caught by the longline and trawl fisheries northwest of Unimak Island. Graphs of CPUE over time recorded a series of spikes, suggesting that waves of fish were moving into the area and being caught or moving on.

RT questions and discussion:

- Some members of the RT objected to the characterizations of biomass inside and outside of Critical Habitat because the NMFS stock assessment surveys were not designed to estimate biomass in any of the smaller (0-10, 10-20, etc.) zones. Fritz acknowledged that the error bounds of these estimates are large, but suggested it was the best that could be accomplished within the requirements of the litigation.

Discussion of Trophic Indicators

PowerPoint presentation provided by Kate Wynne, University of Alaska, Kodiak

If nutritional stress may be/was a potential threat to SSL, a possible source for that threat may be prey quality or quantity limitations for a significant part of the population at some life stage(s). If so, there could be similar patterns in sympatric piscivores using the same prey base. Wynne looked for such evidence in sympatric harbor seals, seabirds, and fish. Unfortunately, there are not many diet versus population trend datasets for other piscivores to allow direct comparison on the same spatial-temporal scales. From those data that are available, piscivores with similar diets have not exhibited the same population trends as SSL since 1990. Harbor seal scats and stomach samples from the Bering Sea, Kodiak, Prince William Sound, and Southeast Alaska suggest that harbor seals eat a mixed diet that includes cod, pollock, salmonids, sandlance, cottids, capelin, herring, and other species in proportions that vary by area and season. Surveys in these areas suggest that while harbor seal populations near the Pribilof Islands and Prince William Sound are in decline, those near Bristol Bay and Sitka are stable and those near Kodiak and Ketchikan are increasing. Tufted puffins and salmon share many prey species in common with SSL (including anchovy, herring, sand lance, smelt, capelin, greenling, cephalopods, and others), but their abundance trends are dissimilar. Abundance trends for tufted puffins appear to be the inverse of SSL (tufted puffins are increasing in areas where SSL are in decline, and vice versa) while salmon catches appear to track climatic regimes. One possible explanation why similar population trends are not apparent in sympatric piscivores could be that SSL are currently not food-limited. Other alternative hypotheses could include: (1) the patterns are artificial, due to anthropogenic effects and chance; (2) there is competition among predators, and as SSL decline food becomes more available to those competitors; (3) differences in prey choice, prey availability, or foraging flexibility favor one predator over another; or (4) population trends are driven mostly by juvenile survival at sea, which occurs on-shelf for SSL and off-shelf for species like tufted puffins and salmon.

RT questions and discussion:

- RT members discussed whether there was evidence of foraging specialization in harbor seals. Such specialization occurs in sea otters, and when diet data from specialists are lumped they can suggest a more varied diet than actually occurs. The RT could identify no specific evidence for such specialization in harbor seals, but noted that there is evidence that SSL often forage in the same areas.
- Members of the audience challenged one of Wynne's suggested conclusions, that SSL are not food limited. They suggested that SSL may not die due to lack of food, but it may be more energetically expensive for them to successfully feed. This could make them more susceptible to death from other causes.
- Some members of the RT were sensitive to use of the term "competition" when describing SSL and other species. They questioned whether these species were truly competing or merely sharing diets that overlap.
- Some RT members suggested that seabirds are dependent on juvenile fishes (or adult forage fishes) for which abundance varies widely, and that the right conditions are needed to make those preys available. Others replied that seabirds are not unlike SSL in this regard, and that there is no evidence seabirds are in a sustained reproductive failure.

Recovery Plan Revision – Status and Approach for Completion

The RT reviewed the status of specific RP sections and reached the following conclusions:

- Section III.H – This section was to be revised to include more information on synergistic effects, but the RT decided to leave this section as written and include specific information on synergistic effects in the DPS-specific sections.
- Conservation Measures (Section IV) – A redraft of this section has been prepared by Capron and distributed to the workgroup. A copy was distributed to the RT at this meeting. Capron's redraft removed much of the "blow-by-blow" character of earlier drafts, leaving a general summary of the types of things that have been done to assist SSL. He was reluctant to address questions of efficacy because some measures were taken as conservation actions that addressed no particular threat, while the rationale for others changed over time. He preferred to address efficacy as it related to current threats (e.g., identify current threats and determine if anything has been done to alleviate them). RT members had envisioned this section as giving readers a sense of what had been done, why it was done, and how well it worked. While they did not want extensive detail, they were concerned about the efficacy of measures that have been taken. The previous RP focused on research needs and dealt with management issues very broadly; Small noted that this RT must still decide on the level of detail it will include in its management recommendations. He suggested that Capron's redraft contained much of what the RT desires, and suggested that RT members consider tables similar to those on pp. 108-109 of the Addendum to the 2001 Biological Opinion to further summarize management actions. RT members were asked to send comments on the Capron draft to Small, who will work with Gelatt, Parker, and Fritz to complete the draft.
- Section V – The RT agreed that the structure of this section need not be revised at this time. Even though the current Western DPS will likely be split, this section can continue to list any

available information on the non-US portion of the DPS. Capron suggested that only minor editorial changes should be necessary once the rule for this action is finalized.

- Capron asked whether the RT would be considering Recovery Units (RU) in this plan revision. A RU approach could increase management options that potentially prevent loss of population subunits (e.g., site-specific Section 7 consultations). RT members agreed that the utility of RUs will depend on the threats, and deferred a decision on RUs until after those threats have been fully identified. Some RT members were concerned that use of RUs might carry connotations beyond management flexibility and suggested that the RT review RU concepts again at that time.
- Sections V.B.2 and VI.B.2 – The RT has yet to receive the output from Barrett-Lennard’s killer whale model that it requested after the February meeting. Trites and Small will work with Barrett-Lennard to ensure that the requested simulations are completed within a few weeks.
- Sections V.B.8 and VI.B.8 – The workgroup (Williams, Trites, Wynne, Fritz, Rea, Behnken, and Springer) will revise these sections on nutritional stress as discussed earlier in this meeting. They hoped that a revised draft should be available by August 25, but expect that it is unlikely to be available until mid-September.
- Background Sections (V.B.1-9 and VI.B.1-9) – The RT discussed whether information gaps should be listed at the end of each threat section, or listed together in their own section. Most members preferred to list the unknowns with each section, and the workgroup (Loughlin, Pitcher, and Calkins) will make those changes. Data that are essential for the RT to acquire will be highlighted later under research priorities. The workgroup hopes to have a near-final draft of these sections available by mid-September.
- Status of prior changes – Some RT members were concerned some changes that had been suggested were not incorporated in subsequent drafts. The workgroup responsible for developing the section in question had not concurred with the suggested changes. Small suggested that RT members hold such comments until the workgroups finalize drafts for each section and submit them to the full RT for review. The workgroups should identify points of contention. At that time RT members should be prepared to discuss with the group the specific changes they believe are needed and why.
- Threat Evaluation Tables – Only 10 RT members responded to the first attempt at completing threat evaluation tables using a scoring system, and only six responded to the second attempt without that system. Byrd and Hanson summarized those responses, noting that many of the threats were ranked similarly under both approaches. RT members suggested that the definitions had been unclear in the earlier exercises, that they had been uncertain how to rank threats whose potential impacts could be large even though they were unlikely to occur, or that they had not known they were expected to respond to both scoring requests. Byrd and Hanson proposed an alternative approach in which the RT could categorize threats (High, Medium, Low) based on their likelihood of contributing to mortality in the near future; they suggested that a workgroup could quantify those threats at a later time. Some suggested linking these threat categories to those in the ESA, but most believed the ESA rankings lacked sufficient detail. Many RT members preferred the original scoring approach, and suggested that another attempt be made after outstanding issues were clarified. One

suggested the following definition of “threat”: A factor that has the capacity to remove animals in a short period of time or reduce reproductive potential. Byrd and Hanson revised the original threat evaluation table, clarifying problematic definitions and removing redundant threat categories, and distributed a revised table to the RT at the end of this meeting. All RT members were asked to submit a new threat evaluation, ranking each threat into one of three probabilities of occurrence categories and one of three mortality level categories.

- Sections V.B.10 and VI.B.10 – Williams asked to be replaced as a member of the workgroup completing this section and suggested Atkinson as an alternate. These sections cannot be completed until the threat sections (B.1-9) and the threat evaluation tables have been completed.
- Recovery Criteria (Sections V.D.1&2 and VI.D.1&2) – Winship has submitted a report describing the status of his model but the report has not been reviewed. The modeling workgroup met with Goodman on July 29, and Small will distribute a summary of that meeting to the RT. Goodman is maintaining the approach he described in February (i.e., he will examine the change from a base population at 32 rookeries under a variety of scenarios). York has provided Goodman with some information that will be useful for parameter estimates. The workgroup has worked through most issues that need to be considered but is still struggling with density dependence; Goodman favors excluding that factor from the model for now. The workgroup must still determine the specific scenario parameters it wishes to consider, and develop triggers/timelines for Threatened/Endangered status. They hope to include distribution as well as population numbers in their status designations. A revised draft should be available after the workgroup meets again in late-September
- Outline and Narrative (Sections V.D.3&4 and VI.D.3&4) – Byrd has received completed outlines from all contributors, but some of the outlines are more detailed. Byrd suggests that all outlines be developed to the third (task) level, and will redistribute those outlines to the contributors with examples of the detail desired. He will integrate the editorial comments and distribute a draft that highlights differences of opinion and decisions that remain. Approximately one third of the narratives have been received, but Byrd will attempt no further progress on this section until the outline has been finalized.

Capron reported that RPs for other species employ a variety of outline and narrative structures that put greater focus on the five ESA listing factors. He will provide Small with alternative examples.

- Implementation and Monitoring (Sections V.D.5&6 and VI.D.5&6) – These sections have not been started and it is too early to estimate when they will be completed.

SSL Interactions with Marine Debris

Ken Pitcher, Alaska Department of Fish and Game

While searching for branded animals, ADF&G researchers in Southeast Alaska see SSL that have become entangled in marine debris or have had interactions with fishing gear. They have been making a more systematic effort to photograph affected animals and document the interactions. Since the field crews are active for only a small portion of the year, they suspect

that they see only a small proportion of the animals that are actually affected. It is not uncommon to see SSL with trolling flashers in their mouths; when the flasher is near the mouth the hook is probably embedded in the animal's stomach. Stomach penetration likely leads to peritonitis and death. Both commercial and sport fishers use flashers, but commercial trollers commonly put flashers on only about 20% of their hooks. It would be difficult to detect animals that have swallowed hooks unassociated with flashers. Other types of fishing gear interactions observed by researchers include gangions from longline gear, and monofilament line from sport fishing gear. Non-fishing debris entanglements involve rope, car tires, packing bands, and other materials. Several apparent gunshot wounds have been documented, as well as possible wounds from killer whales or sharks. While these interactions are probably not driving a decline, it is not difficult to imagine that they could be reducing the growth rate of the Eastern DPS. Researchers occasionally see moribund SSL but do not know if the problems of those animals are related to embedded hooks. Pitcher showed the RT some pictures of affected animals.

RT questions and discussion:

- Loughlin noted that researchers in Western Alaska do not frequently observe trolling flashers (trolling is a legal fishing gear only in Southeast Alaska) but they do observe entanglements with packing bands and other debris.
- Williams added that researchers now regularly x-ray dead sea otters and often find that the animals have swallowed a variety of items that perforate their stomachs. Researchers have also found small caliber bullets that did not cause obvious wounds but led to death from internal bleeding.

Sources of California Sea Lion Mortality Observed on San Miguel Island

Sharon Melin, National Marine Fisheries Service, NMML

The population of California sea lions (CSL) on San Miguel Island is relatively large, with about 22,000 pups born there each year. The number of pup births was increasing at approximately 6% per year until the 1990s, but is now increasing at only about 1% per year. El Niño events in 1992-1993 and 1997-1998 temporarily affected pup production. Seventy to eighty percent of pups born during an El Niño year commonly die, but since adult animals are generally unaffected pup production rebounds following the El Niño event. Researchers are now seeing more disease in the population, a condition they believe may be associated with density dependence. They believe that the animals may have reached carrying capacity on the island, and that other population control factors are now influencing production.

Hookworm infections are a common source of mortality for CSL aged 6 weeks to 6 months. Other disease issues observed on the island are often related to hookworm infections. Mortality during the first 6 months typically results from anemia, and after 6 months from secondary infections caused by intestinal punctures. Hookworms burrow into the soil and may overwinter there. They may be passed to juvenile CSL through their mother's milk. Researchers have observed infection rates up to 100%, with moderate to severe infestation rates. Pup losses have ranged from 65-70% in each of the two most recent years, and researchers anticipate that a significant proportion of pup production could be lost in the time it takes these animals to develop an immunity to the parasite. Since CSL population abundance is monitored through pup

counts, researchers would only detect a population decline if this rate of mortality continued for 4-5 years. CSL are sympatric with fur seals on San Miguel and typically retain hookworm infections for a longer period; there is speculation that the hookworms puncturing CSL intestines may have originated in fur seals and this could increase the time needed for CSL to develop an immunity.

Other diseases observed in CSL on San Miguel include chlamydia, San Miguel sea lion virus, brucellosis, and leptospirosis. Domoic acid poisoning has killed 600-800 adult male and large juvenile animals and caused hundreds of premature births during the last four years. Predation does not appear to be a factor at San Miguel, although some animals are lost each year to entanglement in fishing gear.

RT questions and discussion:

- Melin suggested that evidence of density dependence has not been revealed in other vital rate studies because those studies have not continued for long enough, although there are some suggestions that the evidence will eventually appear. Hookworm infections affect specific cohorts and may reduce survival in the 0-1, 1-2 age classes. It does not appear that hookworm infections influence the survival of animals aged more than two years.
- RT members asked whether the high mortality rates could be influenced by the genetic similarity of the animals in this population. Melin noted that studies are currently underway to investigate the effect of inbreeding.
- When asked whether there would be room on San Miguel for SSL when they recover, Melin speculated that it may depend on when they arrive. Male CSL begin to arrive on the island in May, but do not become territorial until June (30 days post-partum). Pups typically wean at 6-11 months, although in unusual instances a female may nurse a pup into its second year. Weaning usually takes place when the female leaves and fails to return. Juvenile males can be seen taking other food by January (at approximately 7 months) and juvenile females take other food by March. Foraging studies have just begun on San Miguel, and preliminary results suggest that most animals forage close to the island. There are no estimates of the local prey biomass. CSL typically forage on the juveniles of their prey species, and most biomass estimates from fishery data measure different age classes.

SSLRT Meeting Schedule

No date was selected for the next meeting of the SSLRT. RT members must review the several RP sections that are currently being drafted before final discussion and approval at the next meeting. Although workgroups will continue to meet, the full RT may not meet again until early in 2004.

The meeting adjourned to small workgroups at approximately 11:15 on August 1.

Table 1. Attendance at the meeting of the Steller Sea Lion Recovery Team held 30 July – 1 August 2003 at the Alaska Fisheries Science Center, Seattle, Washington.

~	Shannon Atkinson	Alaska Sea Life Center
*	Linda Behnken	Alaska Longline Fishermen's Association
*	Vernon Byrd	U.S. Fish & Wildlife Service
*	Don Calkins	Alaska Sea Life Center
	Shane Capron	National Marine Fisheries Service, OPR
†	Al Didier	Pacific States Marine Fisheries Commission
	Tom Eagle	National Marine Fisheries Service, HQ
*	Doug Eggers	Alaska Department of Fish and Game
*	Dave Fraser	F/V Muir Milach
*	Lowell Fritz	National Marine Fisheries Service
~	Tom Gelatt	Alaska Department of Fish and Game
	Brandee Gerke	National Marine Fisheries Service
*	Dave Hanson	Pacific States Marine Fisheries Commission
	Daniel Hennen	Montana State University
~	Lianna Jack	Alaska Sea Otter and Steller Sea Lion Commission
*	Tom Loughlin	National Marine Fisheries Service
	Lloyd Lowry	US Marine Mammal Commission
*	Donna Parker	F/V Arctic Storm
	Mike Payne	National Marine Fisheries Service, AKR
*	Ken Pitcher	Alaska Department of Fish and Game
	Tim Ragen	US Marine Mammal Commission
**	Bob Small	Alaska Department of Fish and Game
~	Alan Springer	University of Alaska, Fairbanks
	Beth Stewart	Aleutians East Borough
*	Ken Stump	
	Rebecca Taylor	Montana State University
*	Andrew Trites	University of British Columbia & North Pacific Universities Marine Mammal Research Consortium
	Gary Walters	National Marine Fisheries Service, AFSC, RACE
	Mark Wilkins	National Marine Fisheries Service, AFSC, RACE
*	Terrie Williams	University of California, Santa Cruz
	Neil Williamson	National Marine Fisheries Service, AFSC, RACE
	Bill Wilson	North Pacific Fishery Management Council
	Chris Wilson	National Marine Fisheries Service, AFSC, RACE
~	Kate Wynne	University of Alaska, Kodiak
*	Steller Sea Lion Recovery Team Member	
~	Steller Sea Lion Recovery Team Member, absent	
**	Chair, Steller Sea Lion Recovery Team	
†	Rapporteur	

STELLER SEA LION RECOVERY TEAM

Draft Agenda

30 July – 1 August 2003

NMML Conference Room (#2040)

Seattle, Washington

Wednesday, 30 July

8:30 am

1. Review and approval of agenda
2. *Research reports(?)*, *Status of splitting Western DPS (Shane)*, *SSL Mitigation Committee (Shane & Bob)*, *other?*

9:00 am

3. Evaluation of potential sources of nutritional stress

12:00 pm – Lunch Break

1:00 – 5:00 pm

4. Evaluation of Nutritional Stress (continued); Presentation by Dan Hennon @ 1:00

Thursday, 31 July

8:30 am

5. Evaluation of Nutritional Stress (continued)

10:30 am

6. Recovery Plan Revision: Status and approach for completion, including specific tasks and timelines for smaller groups:
 - Background Sections III, V & VI (except B.10 for both)
 - Threat tables
 - Section IV
 - Outline & Narrative
 - PVA simulation results & parameterization

12:00 pm – Lunch Break

1:15 – 3:00 pm

7. Recovery Plan Revision (continued) - Full team discussion on:
 - Threat Tables, PVA and recovery criteria

4:30 pm

8. Smaller groups meet separately
 - Threat tables
 - Revision of chapters on nutritional stress
 - Cumulative and synergistic effects: Sections V.B.10 & VI.B.10
 - Recovery Outline & Narrative
 - Recovery Criteria

Friday, 1 August

9. Smaller groups meet separately